# CD-ROM use by rural physicians

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A survey of 131 eastern Washington rural family physicians showed that 59.5% owned a personal computer with a CD-ROM drive. There was an inverse correlation between the physicians' years in practice and computer ownership: 10 years or less (80.6%), 11 to 20 years (72.2%), 21 to 30 years (55.6%), and more than 30 years (32.4%). Those physicians who owned a computer used their CD-ROM for entertainment (52.6%), medical textbooks (44.9%), literature searching software (25.6%), drug information (17.9%), continuing medical education (15.4%), and journals on CD-ROM (11.5%). Many rural doctors who owned computers felt that CD-ROM software helped them provide better patient care (46.8%) and kept them current on new information and techniques (48.4%). Indications for medical education, libraries and CD-ROM publishers are noted.

## INTRODUCTION

A survey of eastern Washington rural family practice physicians was undertaken to determine to what extent the use of CD-ROM-based medical publications had penetrated rural medical practices and how this technology was perceived by survey participants.

Past studies have explored the information seeking behavior of physicians and their use of technology in answering clinical questions [1–8]. A 1993 study based in central Florida showed that only two of the twelve rural physicians studied utilized information systems from libraries and computers [9], hence, providing evidence for the need of computerized information systems in rural communities. Other research has focused on the sources of medical information by rural and non-rural physicians [10–17]; however, these studies are dated.

The availability of new and interactive medical CD-ROM software [18–23] and the promotion of this technology in physician-oriented publications [24–28] prompted the present study, which was designed to answer the following questions: "Do rural physicians in eastern Washington own a personal computer with a CD-ROM; if so, what types of CD-ROM programs are being used and why are these programs useful?"

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## METHODOLOGY

A sample of 155 eastern Washington rural family practice physicians was surveyed in three mailings from June to September 1997. The questionnaire and a short letter stating the purpose and intent of the survey were sent to 155 of the 307 family practice doctors identified through the American Medical Association [24] and randomly chosen from all rural eastern Washington telephone books obtained from a local library. The questionnaire consisted of six simple questions printed on a four-by-six-inch postage-paid, self-addressed postcard. It inquired about the physician's years of practice, computer ownership, program usage, and CD-ROM opinions (Appendix).

Each questionnaire was given the letter A, B, or C denoting the population of the rural community to which the questionnaire was sent: "A" designated fewer than 4,000 people, "B" 4,000 to 8,000 people, and "C" 8,000 to 12,000 people. Every questionnaire also received a unique number in order to keep a record of which doctors participated in the survey. A follow-up questionnaire to nonresponders was used to boost response rate and eliminate any nonresponse bias.

## RESULTS

### Question 1: physician's years of practice

Of the 155 eastern Washington rural family physicians surveyed, usable questionnaires were returned by 131

providers (84.5%). The physicians were categorized into four groups based on their years in practice: 10 years or less (n = 31, 23.7%), 11 to 20 years (n = 36, 27.5%), 21 to 30 years (n = 27, 20.6%), and more than 30 years (n = 37, 28.2%).

### Question 2: computer ownership

Of the 131 respondents, 78 physicians reported owning a personal computer equipped with a CD-ROM (59.5%). The data showed an inverse relationship between the physicians' years in practice and computer ownership: less than 10 years (80.6%), 11 to 20 years (72.2%), 21 to 30 years (55.6%), and more than 30 years (32.4%).

### Question 3: CD-ROM program usage

The physicians with a CD-ROM computer were asked to select from nine categories of CD-ROM programs that they used in their practice; these categories ranged from entertainment to medicine-related uses. Table 1 outlines the nine major categories and responses organized by physicians' years in practice and an overall total and ranking of the CD-ROM categories.

### Question 4: CD-ROM opinions

The physicians with a CD-ROM computer were asked to circle a number from one to three to show whether they disagreed (score of 1) or agreed (score of 3) with four statements based on the benefit of CD-ROM software in clinical practice. An average score for each statement was calculated and is listed in Table 2.

### Question 5: most valuable CD-ROM programs

The most valuable CD-ROM programs based on the physicians' responses are listed in Table 3. The three most popular CD-ROM programs were *Scientific American Medicine* (*SAM*), MEDLINE on CD-ROM, and the *Physicians' Desk Reference* (*PDR*).

### Question 6: CD-ROM programs that would be useful

Finally, respondents were asked to describe one type of program that they felt would be of value to their practice. There was a wide variety of answers including pediatric diseases and symptoms; patient education material; interactive medical education with case histories for diagnosis and treatment; algorithmic approaches to diagnosis using symptoms, lab data, and physical exam findings as key words or phrases; programs for developing bilingual patient information sheets; drug interaction programs; interactive treatment of sports injuries; long-term storage of medical records; combined internal medicine, pediatric, and gynecology problem solving programs; and interactive surgical anatomies.

### Population-based data

Data were also separated into three groups based on the population of the rural community: "A" (<4,000 people), "B" (4,000–8,000 people), and "C" (8,000–12,000 people). Results indicated that the percentage of physicians owning a computer increased with larger populations: 50.9% of group "A" owned a computer, 61.1% of group "B" owned a computer, and 77.3% of group "C". Patterns of medical software usage remained constant across the three populations with the entertainment, books on CD-ROM, and literature searching software categories remaining as the CD-ROMs used most by rural family physicians.

## DISCUSSION

### Physician age and CD-ROM correlation

The 84.5% response rate of 155 randomly chosen physicians who had a CD-ROM exceeded expectations. The high response rate to the questionnaire also reduced the nonresponse bias due to physicians who failed to return the questionnaire because they did not have a computer.

By categorizing the physicians into four categories based on their years of practice, an important correlation can be made based on CD-ROM usage. The results showed that the percentage of physicians owning a computer equipped with a CD-ROM decreased with the number of years of practice. Older physicians who have been practicing for many years may find keeping pace with new technology difficult when they have relied on journals and texts throughout their careers. The extra time needed to learn about computers and their applications may be perceived as more of a burden than a benefit.

### Common programs used by physicians

This study outlines the most common CD-ROM programs being used by rural physicians in eastern Washington as seen in Table 1. The data from physicians with a CD-ROM (n = 78) show that the most commonly used CD-ROM programs by rural doctors are those that provide entertainment (52.6%). In medicine-related software, the major programs being utilized relate to texts, literature searching software, and drug information.

Given the relatively large number of medicine-oriented information on CD-ROM, it is surprising that a higher percentage of rural physicians are not taking advantage of this valuable asset. Although the data in Table 1 show that rural physicians are using different types of medical software, the percentages appear low for doctors who may be miles from the nearest library. There may be a variety of reasons for this discrepancy. One reason may be a lower percentage of younger physicians in rural areas, so older physicians, who

**Table 1**
Types of CD-ROM programs utilized by rural family physicians

| CD-ROM software | Physicians (n = 78) with a CD-ROM computer categorized by years in practice | | | | |
|---|---|---|---|---|---|
| | ≤10 (n = 25) | 11–20 (n = 26) | 21–30 (n = 15) | >30 (n = 12) | Total (n = 78) |
| Entertainment (i.e., nonmedicine-related uses) | 80.0% | 42.3% | 40.0% | 33.3% | 52.6% |
| Books on CD-ROM (i.e., medical textbooks or dictionaries) | 56.0% | 53.8% | 33.3% | 16.7% | 44.9% |
| Literature searching software (i.e., MEDLINE on CD-ROM) | 32.0% | 19.2% | 26.7% | 25.0% | 25.6% |
| Drug information (i.e., Physician GenRx, PharmAssist) | 28.0% | 19.2% | 13.3% | 0% | 17.9% |
| Continuing medical education (i.e., family practice recertification) | 12.0% | 23.1% | 20.0% | 0% | 15.4% |
| Journals on CD-ROM (i.e., *American Family Physician*) | 20.0% | 7.7% | 6.7% | 8.3% | 11.5% |
| General reference (i.e., AIDS and cancer information) | 20.0% | 7.7% | 0% | 8.3% | 10.3% |
| Basic education (i.e., anatomy, pathology) | 8.0% | 7.7% | 13.3% | 0% | 7.7% |
| Medical graphics (i.e., medical clip art) | 4.0% | 3.8% | 0% | 0% | 2.6% |

have relied on texts and journals, skew the findings. The American Medical Association's *Physician Data by County* reports that 16.7% of eastern Washington family and general practitioners are younger than 35 years of age, 70.3% are age 35 to 64, and 13.0% are older than 65 years of age [25]. An additional reason may be the cost of CD-ROM programs, which can run from $100 to $1,200. A physician could buy a number of texts for the price of a single CD-ROM.

### Clinical advantages of CD-ROM

As shown in Table 2, more than 40% of the physicians agreed with three of the four questions inquiring about the assets of CD-ROMs to their practice. Physicians felt that CD-ROM programs assist them in providing better patient care and remaining current on new information; however, only 26.2% thought that the computer saved time in their practice.

### Useful CD-ROM programs

Table 3 lists the programs that rural physicians found most useful in their practice. The interest in some of these programs may help guide the development of new CD-ROM programs and market them toward rural community doctors. Although many creative ideas for developing new programs are possible, much of the software listed by physicians already exists on CD-ROM. This lack of awareness could be diminished by forwarding information on CD-ROM software to rural physicians and by further utilizing this technology in clerkship and residency programs in order to stress its innovation and importance to the new generation of doctors.

## CONCLUSION

This study suggests that those physicians with a computer find them valuable to their practice, although greater than 40% of rural doctors do not own computers and the percentage of physicians not owning a computer increases with age and the smallness of the community.

Because a majority of older-aged physicians do not own a computer, libraries serving rural communities should consider maintaining updated medical texts and current journals for review. Larger libraries, especially those in the university setting, may want to consider programs that prepare medical students to practice evidence-based medicine in a nonuniversity setting by developing programs aimed at self-sufficiency using CD-ROM publications or Internet resources such as PubMed. Because younger doctors are more likely to own a computer with a CD-ROM, university libraries can help familiarize students with the best publications available on CD-ROM or via the Internet in advance of the time that these students will be practicing in a rural area.

While it is unrealistic to think that older, rural physicians can be persuaded of the benefits to them in

**Table 2**
Physicians' impressions of CD-ROM software for clinical use

| CD-ROM questionnaire statements | Physician responses (n = 78) | | | |
|---|---|---|---|---|
| | Disagree = 1 | Neutral = 2 | Agree = 3 | Average score |
| Keeps me current on new information and techniques | 14.1% | 37.5% | 48.4% | 2.34 |
| Helps me provide better care for my patients | 14.1% | 39.1% | 46.8% | 2.32 |
| Allows me to locate pertinent information more quickly | 11.3% | 46.8% | 41.9% | 2.30 |
| Saves time in my practice when seeking information | 14.8% | 59.0% | 26.2% | 2.11 |

**Table 3**
Physicians' most valuable CD-ROM programs

| Programs and total physician votes | | | |
|---|---|---|---|
| *Scientific American Medicine* (*SAM*-CD) | 15 | Infopedia | 1 |
| MEDLINE on CD-ROM | 4 | MAXX Electronic Library of Medicine | 1 |
| *Physicians' Desk Reference* | 4 | Med Ed | 1 |
| *Harrison's Principles of Internal Medicine* | 3 | *The Merck Manual* | 1 |
| Drug Interactions: Facts and Comparisons | 2 | Microsoft Bookshelf | 1 |
| *Family Practice Journal* | 2 | *Mosby's Emergency Medicine* | 1 |
| Physicians GenRx | 2 | *Mosby's Pediatric Emergency Medicine* | 1 |
| A.D.A.M. | 1 | *Netters Atlas of Human Anatomy* | 1 |
| AAFP Journals | 1 | Occupational and Environmental Medicine | 1 |
| ACP Library on Disc | 1 | Poison Index | 1 |
| American Family Practice | 1 | Primary Practice | 1 |
| Billing Software | 1 | Printshop | 1 |
| Cecil's Internal Medicine | 1 | Quick Scan Reviews | 1 |
| Clinical Dermatology | 1 | STAT!—Ref CD | 1 |
| CPT | 1 | Transparent Language | 1 |
| Encarta Encyclopedia | 1 | WordPerfect | 1 |
| ICD-9 | 1 | | |

purchasing a computer and buying CD-ROM programs, university libraries could provide an assortment of current, advanced, medical software with which future rural family physicians can become familiar and ultimately use to benefit health care in rural communities.

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## Appendix

### CD-ROM survey questionnaire

1. How many years have you been a practicing physician? ≤10yrs 11–20yrs 21–30yrs >30yrs
2. Do you own a personal computer with a CD-ROM? Yes No
3. Please mark the types of CD-ROM programs that you utilize in your practice:
   [ ] Drug information (i.e., Physician GenRx, PharmAssist)
   [ ] Books on CD-ROM (i.e., medical textbooks, encyclopedias, and dictionaries)
   [ ] Literature search software (i.e., MEDLINE on CD-ROM)
   [ ] Journals on CD-ROM (i.e., *American Family Physician, The New England Journal of Medicine*)
   [ ] General reference (i.e., disease, AIDS, and cancer information, specialty information)
   [ ] Continuing medical education on CD-ROM (i.e., family practice recertification, current techniques in surgery)
   [ ] Basic education (i.e., heart and breath sounds, anatomy and physiology, pathology)
   [ ] Medical graphics (i.e., medical clip art, color illustrations)
   [ ] Entertainment (i.e., games, nonmedicine-related uses)
4. Please circle one of the following numbers indicating whether you agree or disagree with these CD-ROM software statements:

| | Disagree | Neutral | Agree |
|---|---|---|---|
| ■ Helps me provide better care for my patients | 1 | 2 | 3 |
| ■ Keeps me current on new information and techniques | 1 | 2 | 3 |
| ■ Saves time in my practice when seeking information | 1 | 2 | 3 |
| ■ Allows me to locate pertinent information more quickly | 1 | 2 | 3 |

5. Please provide the name of your two most valuable CD-ROM programs:
6. Please describe a type of program that you would find very useful on CD-ROM: